

Introduction to Energy & Power

Course Code: 20101

Rationale Statement:

Introduction to Energy & Power is used every day in many different ways. To become a more environmentally friendly society, students will have a basic understanding of the various types of energy and how energy is obtained. Everyone should know what energy sources are available that do not pollute the environment and how this energy can be converted into a useful power supply.

Suggested Grade Level: 9-10

Topics Covered:

- History and effects on society
- Relationship between work, energy, and power
- Transmission of power
- Alternative power
- Safety

Core Technical Standards & Examples

Indicator #1: Analyze the history of energy/power sources and their effect on society	
Bloom's Taxonomy Level	Standard and Examples
Analyzing	EP.1.1 Examine the historical development of energy/power production Examples: <ul style="list-style-type: none"> • Develop a timeline depicting the development of engines • Write a paper on a famous inventor • Give an oral report on the development of a power system
Analyzing	EP.1.2 Assess the impact of energy/power on the way we live and work Examples: <ul style="list-style-type: none"> • List various energy sources and machines used prior to the 21st century • Select an invention and write a short paper describing its impact on society, both positive and negative • Examine how the past use of energy and machines has negatively impacted our planet

Indicator #2: Examine the relationship between work, energy, and power	
Bloom's Taxonomy Level	Standard and Examples
Understanding	EP.2.1 Define work, power, and energy Examples: <ul style="list-style-type: none">• Define work• Recall the formula for power• Describe energy
Analyzing	EP.2.2 Examine the relationship between power sources Examples: <ul style="list-style-type: none">• Describe the difference between weight, mass, and force• Use equations to find missing information pertaining to work, energy and power• Compute the efficiency of a machine

Indicator #3: Understand the transmission of energy & power	
Bloom's Taxonomy Level	Standard and Examples
Understanding	EP.3.1 Understand how a mechanical system operates Examples: <ul style="list-style-type: none"> • Classify power trains as being either direct or indirect • List the various parts of a power train • Identify the parts of a power train
Applying	EP.3.2 Understand the types of simple machines Examples: <ul style="list-style-type: none"> • Construct an example of a simple machine • Classify the various types of levers and give an example of each • Compute the mechanical advantage of various simple machines
Understanding	EP.3.3 Understand both liquid and gas forms of power transmission Examples: <ul style="list-style-type: none"> • List the various forms of fluid power • Examine results from actions applied on liquids and gases • Understand the laws that govern fluids
Understanding	EP.3.4 Understand the laws that govern electricity Examples: <ul style="list-style-type: none"> • State Ohm's Law • Match symbols to quantities • Define electrical quantities

Indicator #4: Understand alternative energy	
Bloom's Taxonomy Level	Standard and Examples
Understanding	EP.4.1 Understand the sources of alternative energy Examples: <ul style="list-style-type: none"> • Compare and contrast the types of alternative energy sources • Prepare a presentation on synthetic fuels • List possible alternative energy sources
Analyzing	EP.4.2 Analyze the sources alternative of energy Examples: <ul style="list-style-type: none"> • Explain the environmental pros and cons for any one of the alternative energy sources • Present an oral presentation over one of the alternative energy sources • Construct a model of an alternative energy apparatus

Indicator #5: Implement safety with power technology	
Bloom's Taxonomy Level	Standard and Examples
Applying	EP.5.1 Examine safety issues relating to mechanical systems Examples: <ul style="list-style-type: none"> • Follow safety rules relating to moving mechanical systems • Explain the proper method of lifting • Observe and follow all lab safety rules
Applying	EP.5.2 Employ safety practices with fluids Examples: <ul style="list-style-type: none"> • Follow all safety rules relating to high-pressure lines • Demonstrate the proper cleanup method for fluids • Know proper storage methods for flammable/toxic liquids
Understanding	EP.5.3 Identify fire classification and extinguishers Examples: <ul style="list-style-type: none"> • Identify the types of fires • List which extinguisher will fight which type of fire • Identify the locations of fire extinguishers in the lab
Applying	EP.5.4 Employ safety practices with electricity Examples: <ul style="list-style-type: none"> • Operate and use proper personal protective equipment • Follow all safety rules based on <i>Occupational Safety and Health Administration</i> standards • Develop policies for the lab based on various emergency situations

Indicator #6: Understand scientific concepts for energy & power technology	
Bloom's Taxonomy Level	Standard and Examples
Understanding	<p>EP.6.1 Understand how energy converts from one form to another</p> <p>Examples:</p> <ul style="list-style-type: none"> Recall the concept of the Law of Conservation of Energy Differentiate between potential and kinetic energy Identify the sources of energy
Understanding	<p>EP.6.2 Understand the categories of energy.</p> <p>Examples:</p> <ul style="list-style-type: none"> Classify the various energy sources Recall the various methods of transferring energy Identify how various energy sources are used
Understanding	<p>EP.6.3 Understand that an engine performing work does exhaust thermal energy that cannot be retrieved to the surroundings</p> <p>Examples:</p> <ul style="list-style-type: none"> Compare the efficiency of various types of light bulbs Compare the efficiency for multiple energy sources Define the Law of Thermodynamics
Understanding	<p>EP.6.4 Understand that energy sources can be renewable and non-renewable</p> <p>Examples:</p> <ul style="list-style-type: none"> Provide examples of renewable energy sources Provide examples of nonrenewable energy sources List methods that are being used to conserve energy